Operations with Fractions

To add or subtract fractions with different denominators, _____.

To multiply two fractions, _____.

To divide two fractions, _____.

A fraction is in simplest form when _____.

Exponents and Radicals

Integer and Rational Exponents

In general, if b is a real number and r is a positive integer, then $b^r = \underbrace{b \cdot b \cdot b \cdots b}_{r \text{ factors}}$, where r is the _____ and b is the _____ .

Complete the following properties of exponents.

$(ab)^m =$ _____ $a^{m+n} =$ _____ $a^{mn} =$ _____ $a^0 =$ _____

$\frac{1}{a^n} =$ _____ $\frac{a^m}{a^n} =$ _____ $\left(\frac{a}{b}\right)^m =$ _____ $a^{1/n} =$ _____

Example 1: Simplify the expression $\frac{x^{3/4}}{x^{2/3}}$.

Example 2: Simplify the expression $x^{3/4} \bullet x^{3/5}$.

Example 3: Write the radical expression $\sqrt[4]{w^9}$ in exponential form. Write the exponential expression $x^{3/4}$ in radical form.

Example 4: Simplify the expression $(x^2)^{\frac{1}{4}}$

Radicals and Their Properties

Let a and b be real numbers. If $a = b^2$, then b is the _____ of a. If $a = b^3$, then b is the _____ of a. In $\sqrt[n]{a}$, the positive integer n is the _____ of the radical, and the number a is the _____. The radical expression $\sqrt{-36}$ is not a real number because _____.

Simplifying Radicals

An expression involving radicals is in **simplest form** when the following conditions are satisfied:

1) _____.

2) _____.

3) _____.

Radical expressions are **like radicals** when _____. To add or subtract **like radicals** _____.

Example 1: Simplify each radical expression.

(a) $-\sqrt{\frac{81}{16}}$ (b) $\sqrt[3]{3} - 5\sqrt[3]{3}$ (c) $\sqrt{8}$ (d) $\sqrt{136}$ (E) $\sqrt[3]{m} + \sqrt[3]{9}$

Rationalizing Denominators and Numerators

The **conjugate** of the radical expression $a + b\sqrt{m}$ is _____. To rationalize a denominator of the form $a - b\sqrt{m}$ or $a + b\sqrt{m}$, multiply _____.

Example 1: Simplify the radical expression by rationalizing the denominator of the expression

(a) $\frac{4}{\sqrt{8}}$ (b) $\frac{4}{5-\sqrt{8}}$

Polynomials

In **standard form,** a polynomial in x is written with _____.

Polynomials with one term are called _____.

Polynomials with two terms are called _____.

Polynomials with three terms are called _____.

For polynomials in one variable, the degree of the polynomial is _____.

Example 1: Write the polynomial $1 - 6y - 5y^3 + 4y^2$ in standard form and find the degree of the polynomial.

Operations with Polynomials

Like terms are terms that have _____.

To add or subtract polynomials, _____.

To find the product of two polynomials, _____.

Example 1: (a) Subtract: $(5x^3 - 9x + 4) - (2x^3 + 5x^2 - 12x + 4)$ (b) Multiply: $(3x - 2)(x^2 + 2x - 1)$

Example 2: (a) Multiply: $(3x - 4)^2$ (b) Multiply: $(x + 2)^2$

Factoring Polynomials

Factoring is _____. If a polynomial does not factor using integer coefficients, then it is _____ or _____.

The simplest type of factoring involves a polynomial that can be written as the product of a monomial and another polynomial.

The technique used here is the Distributive Property in reverse: $ab + ac =$ _____

Example 1: Factor: (a) $3w^3 - 12w^2 + 15w$. Factor: (b) $9x^2 - 18$

Trinomials with Binomial Factors

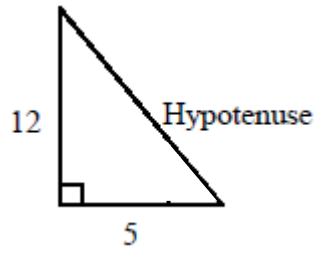
To factor a trinomial of the form $ax^2 + bx + c = ([]x + [])([]x + [])$, the goal is to _____ _____.

Example 1: Factor: (a) $x^2 + 3x - 18$ Factor: (b) $9x^2 + 12x + 4$

Mathematical Models

The **Pythagorean Theorem** states that for a right triangle with hypotenuse of length c and sides of lengths a and b, the mathematical relationship between a, b, and c is _____.

Example 1: In the right triangle below, find the length of the hypotenuse, by using the **Pythagorean Theorem**



The **Distance Formula** states that _____.

Example 1: Find the distance between the points (4, 2) and (5, – 1).

The **Midpoint Formula** gives the midpoint of the segment joining the points (x_1, y_1) and (x_2, y_2) as _____.

Example 1: Find the midpoint of the line segment with endpoints at (– 8, 2) and (6, – 10). Then find the coordinates of the midpoint.

Linear Equations in One Variable

A linear equation in one variable x is an equation that can be written in the standard form _____, where a and b are real numbers with $a \neq$ _____. A linear equation has _____ solution(s).

Example 1: Solve $5(x + 3) = 35$ two different ways.

Rational Equations That Lead to Linear Equations

A rational equation is _____. To solve a rational equation, _____. A rational equation with a single fraction on each side can be cleared of denominators by _____, that is, multiplying the left numerator by the right denominator and the right numerator by _____. Then, solve the linear equation

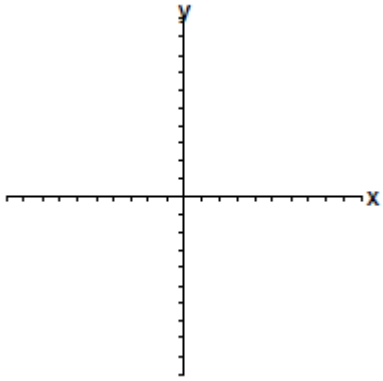
Example 1: Solve: (a) $\frac{5x}{7}=\frac{9}{14}$ Solve: (b) $\frac{1}{x+1}+\frac{5x}{x-1}=\frac{4}{x-1}$

The Graph of a Linear Equation in Two Variables

The **linear equation in two variables** $y = mx + b$ is called *linear* because _____.
A line whose slope is positive _____ from left to right. A line whose slope is negative _____ from from left to right. The **slope-intercept form** of the equation of a line is _____, where m is the _____ and the y-intercept is (____, ____). A vertical line has an equation of the form _____.
The equation of a vertical line cannot be written in the form $y = mx + b$ because _____
To sketch the graph of a linear equation in two variables use the point-plotting method.

Example 1: Complete the table. Then use the resulting solution points to sketch the graph of the equation $y = 3 - 0.5x$.

x	-4	-2	0	2	4
y					



The slope and the y-intercept of a linear equation in two variables can be used to sketch the graph of a linear equation in two variables

Complete the following steps to sketch the graph of a linear equation in two variables using slope and the y-intercept

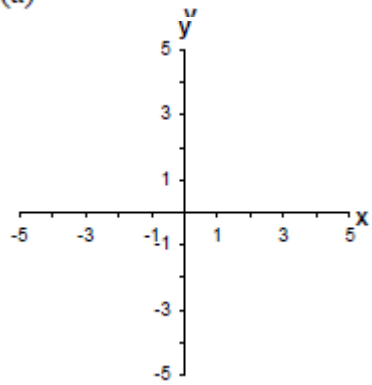
1) _____.

2) _____.

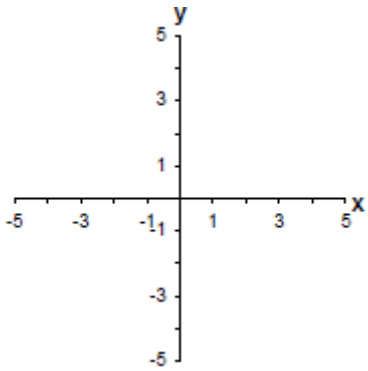
3) _____.

Example 1: Sketch the graph of (a) $y = -1$ (b) $x = 3$ and (c) $y = -2/3x - 4$.

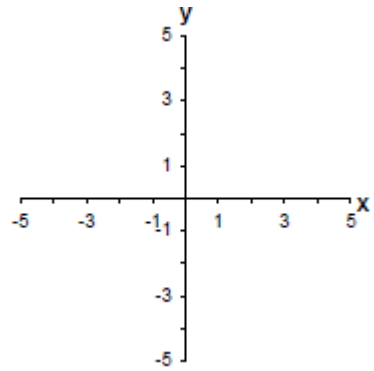
(a)



(b)



(c)



Finding the Slope of a Line

The slope m of the nonvertical line through (x_1, y_1) and (x_2, y_2) is $m =$ _____

Example 1: Find the slope of the line through the points $(-2, 5)$ and $(4, -3)$.

Writing Linear Equations in Two Variables

Complete the following steps to write linear equations in two variables

1) _____.

2) _____.

Functions and Function Notation

The symbol _____ is **function notation** read as *the value of f at x* or simply *f of x*. Keep in mind that _____ is the name of the function, whereas _____ is the value of the function at x.

Example 1: If $f(w) = 4w^3 - 5w^2 - 7w + 13$, find $f(-2)$.

Example 2: If $f(x) = \sqrt{5x} + 13$, find $f(5)$